

CLAIMS

*Sub B* → 1. A machine component coated with a thermal barrier coating, wherein the thermal barrier coating comprises a mixture of at least a refractory material and an indicator material having an optical emission spectrum which varies in response to the temperature of at least a region of the component.

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*Sub B* → 2. A component according to claim 1, wherein the component is coated with one or more priming layers over which the thermal barrier coating is coated.

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A component according to claim 1 or 2, wherein the indicator material has an optical emission spectrum which varies in response to a physical parameter of the component.

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A component according to claim 3, wherein the indicator material has an optical emission spectrum which varies in response to at least one physical parameter selected from the group consisting of a physical strain applied to at least a region of the component, erosion of at least a region of the component, and a physical stress of at least a region of the component.

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A component according to any of claims 1 to 4, wherein the refractory material is selected from the group consisting of yttria stabilised zirconia, yttria partially stabilised zirconia, and yttria aluminium garnet.

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6. A component according to any of claims 1 to 5, wherein the indicator material is a phosphor material.

7. A component according to any of claims 1 to 5, wherein the indicator material comprises a rare earth dopant.

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8. A component according to claim 7, wherein the indicator material comprises a dopant selected from the group consisting of terbium, europium, and dysprosium.

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9. A component according to any of claims 1 to 8, wherein the indicator material comprises a compositionally-graded structure, a composite structure, or a multi-phase structure.

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10. A component according to any of claims 1 to 9, wherein the thermal barrier coating comprises a layered structure of indicator materials having different respective emission spectra.

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11. A component according to any of claims 1 to 10, wherein the thermal barrier coating comprises a layered structure of an outermost, substantially transparent region and a region including an indicator material optically interrogatable through the substantially transparent region.

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12. A component according to any of claims 1 to 11, wherein the component is a component of a combustion engine.

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13. A component according to claim 12, wherein the component is a component of a gas turbine engine.

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14. A component according to claim 13, wherein the component is a turbine blade.

15. A component according to claim 13, wherein the component is a heat shield.

16. Use, as a thermal barrier coating for coating a machine component, of a mixture of at least a refractory material and an indicator material having an optical emission spectrum which varies in response to a physical parameter of the coated component.

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17. A machine having one or more internal components coated with a thermal barrier coating according to claim 16, the machine comprising:  
a light source for directing an interrogating light beam onto the one or more components; and  
a light collector for collecting light from the one or more components.

18. A machine according to claim 17, further comprising an analyser for detecting a physical property of the one or more components by analysis of light collected from the one or more components.

19. A machine according to claim 17 or 18, wherein the machine is a combustion engine.

*Machine* >